

Congenital Dislocation of the Hip

Prognostic Implications of Early Diagnosis

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A retrospective analysis of 62 patients with 78 congenital dislocations of the hip (CDH) referred to Children's Hospital at Stanford was done to ascertain whether CDH was being diagnosed as early as had been thought possible and whether various treatments were effective. In this series there were a substantial number of cases of CDH that were not diagnosed within the first 48 hours of life. At Children's Hospital the Pavlik harness was the most effective form of treatment of congenital dislocations of the hip in the perinatal period.

MANY PHYSICIANS now believe that with the use of a few simple clinical tests and the subsequent application of a few simple devices, congenital dislocation of the hip (CDH) can be readily diagnosed and treated. Reports from Malmö^{1,2} and Manchester³ have set high standards for both sensitive screening for CDH and effective therapy. However, in a recent assessment by Jones and co-workers⁴ of examinations of the hips in newborn infants, it was concluded that 50 percent of the cases of CDH were missed despite examinations during the first 48 hours of life. Furthermore, different authors have reported difficulties with treatment despite early diagnosis.⁵⁻⁸

The questions raised in this study are (1) Is CDH being diagnosed as early as has been thought possible—that is, within the first 48 hours after birth? (2) If CDH is diagnosed within 48 hours, are a variety of splinting techniques all equally effective, or is there one device that is most effective?

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Submitted, revised, December 28, 1978.

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Children's Hospital at Stanford is a referral center for pediatrics in the San Francisco Bay area. Between 1972 and 1977, there were 62 patients with 78 congenital dislocations of the hip seen in consultation. This paper presents a retrospective analysis of these cases and focuses on the time of diagnosis and the efficacy of management.

Case Material

All of the 62 cases of CDH referred to the hospital between 1972 and 1977 were reviewed with respect to the age of the patients at the time of diagnosis and at the time of referral, the therapy undertaken and results of therapy. Diagnosis was based on clinical instability of the hip as described by Le Damany,⁹ Ortolani¹⁰ and Von Rosen,¹¹ and roentgenographic confirmation according to Hilgenreiner¹² or Von Rosen¹¹ or both. Of the 62 patients, 51 were girls and 11 were boys. The left hip was dislocated in 29 patients, the right hip in 17 and both hips in 16.

Two groups were distinguished: Group 1 consisted of 64 hips in infants who were referred after the diagnosis was made and treatment had

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TABLE 1.—Forms of Primary Therapy in 62 Patients (78 Hips)

Number of Patients	Number of Hips	Therapy
9	11	triple diapers
15	19	abduction devices
13	15	Pavlik harness
17	22	closed reduction
8	11	open reduction

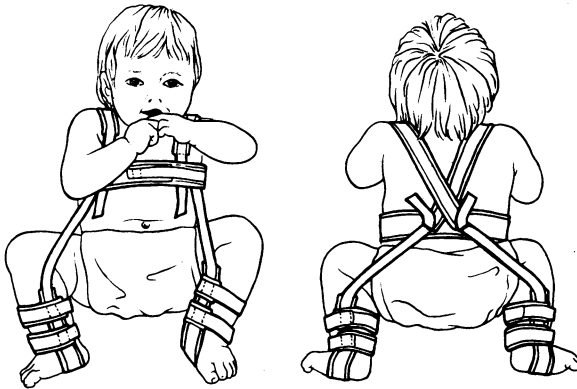


Figure 1.—The Pavlik harness, when well-fitted, keeps both hips flexed in "human position" and allows a good range of motion in abduction and adduction.

been instituted elsewhere. The reason for referral in 44 cases (57 hips) was failure of initial treatment. In five patients (seven hips) referral was made for a second opinion concerning the type of treatment. Group 2 consisted of 13 patients with 14 dislocated hips referred before treatment. The condition was diagnosed in four of these after one year of age, and in two between four months and one year of age. Only three of these dislocations were discovered within the first 48 hours of life.

Methods

Forms of treatment were divided into four general classifications: (1) triple diapers, (2) abduction devices (Barlow, Von Rosen and Craig splints, and the Frejka pillow), (3) the Pavlik harness and (4) traction and closed reduction. Open reduction was done in some cases but results of this treatment are beyond the scope of this paper and, therefore, not reported (Table 1). In this institution the Pavlik harness¹³ (Figure 1) and open reduction were the principal methods of treatment. Follow-up included both clinical and roentgenographic examinations. The mean duration of follow-up has been 3 years and 9 months with a range of 5 months to 14 years.

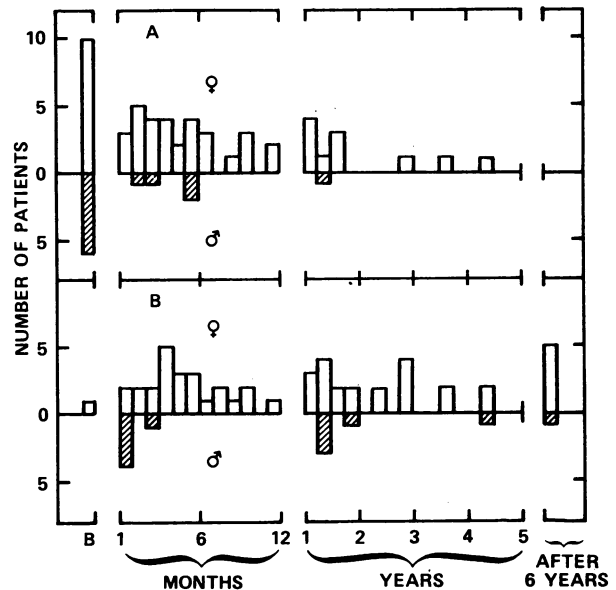


Figure 2.—Patients in the study (males, crosshatched bars). A, Age at diagnosis. B, Age at referral.

Results

Age at Initial Diagnosis

In 16 patients congenital dislocation of the hip was diagnosed at birth (less than 48 hours after birth), in 14 it was diagnosed between 48 hours and four months, in 20 between 4 and 12 months and in 12 more than 12 months after birth. Only one patient was referred at the time of birth while 33 were referred after the age of one year. Six were not referred until the age of six years. (See Figure 2.)

Types of Initial Treatment

Tables 2 through 5 show the effectiveness of treatment. Success was defined as that which required no further therapy. Failure was defined using three criteria: (1) complete failure of relocation or redislocation, (2) partial failure due to residual acetabular dysplasia and (3) partial failure due to aseptic necrosis of the femoral capital epiphysis.

Triple Diapers

In nine patients, 11 dislocatable hips were treated with triple diapers (Table 2). In ten of these, hips relocation did not occur and four were subsequently treated successfully with a Pavlik harness. Of these four, three had been diagnosed within 48 hours after birth and one had been diagnosed between 48 hours and four months after birth. In the other six hips treated unsuc-

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TABLE 2.—11 Hips Treated With Triple Diapers

	Success	Failure
Within the first 48 hours	5
Third day to fourth month ..	..	5
After the fourth month	1	..

TABLE 3.—26 Hips Treated With an Abduction Device, 19 as a Primary Treatment

	Success	Dysplasia	Redislocation	Aseptic Necrosis
Primary treatment				
Within the first 48 hours	4	1(?)	3	2
Third day to fourth month	1	..	3	..
After the fourth month	3	3	1	..
Secondary treatment .	3	..	4	..

TABLE 4.—29 Hips Treated With a Pavlik Harness, 15 as a Primary Treatment

	Success	Dysplasia	Redislocation	Aseptic Necrosis
Primary treatment				
Within the first 48 hours	3	..	..	..
Third day to fourth month	7	..	..	..
After the fourth month	3	2	..	..
Secondary treatment	8	1	3	2

cessfully with triple diapers, closed or open reduction was necessary for relocation. The only case with a successful outcome in this group treated with triple diapers was one in which initial treatment with diapers was delayed until four months after birth and no further treatment was required.

Abduction Devices

Abduction devices were used as initial treatment of 19 hips in 15 patients (Table 3). The mean duration of follow-up in this group was three years, two months (with a range of six months to eight years). The result was successful in eight hips in seven patients. Three patients were referred for completion of treatment previously instituted. In one patient dysplasia of the acetabulum appeared which resolved with prolonged treatment with an abduction device. In one patient the hip was relocated, but abduction and flexion contracture developed. An arthrogram of the hip was required for evaluation and the contractures were relieved with traction.

Among 11 hips in which treatment failed (eight patients), seven were failures of relocation and three showed persistent acetabular dysplasia at the time of follow-up (34 months). In the third patient with acetabular dysplasia in one hip, bilateral aseptic necrosis of the femoral capital

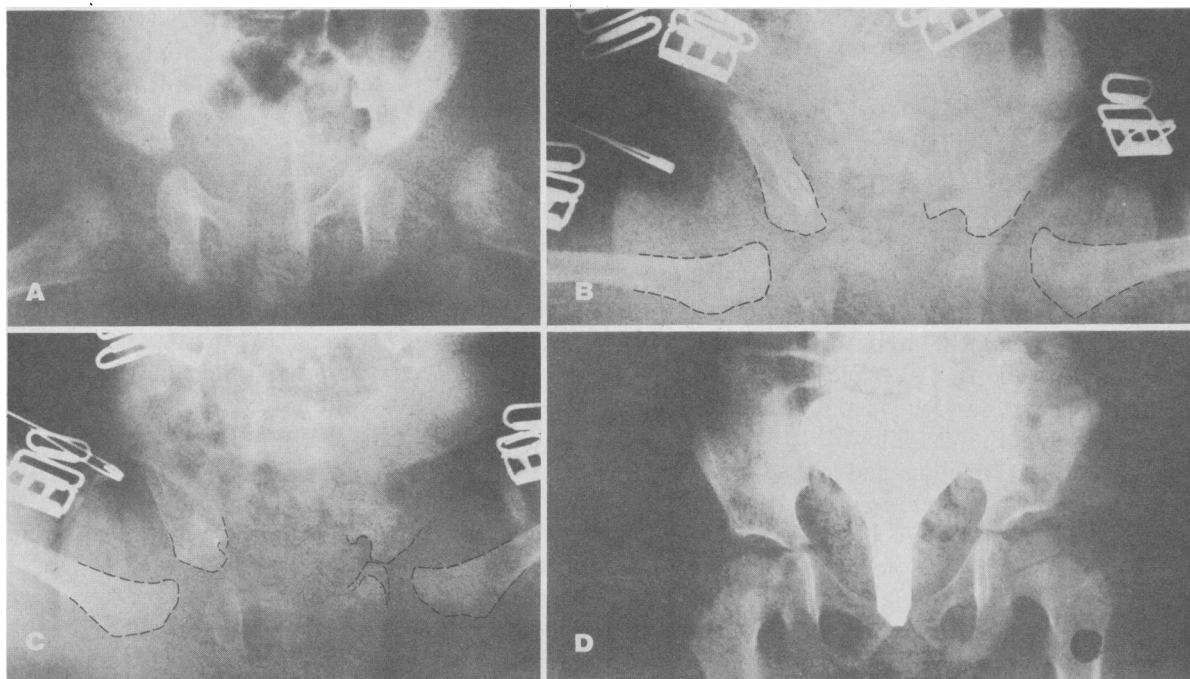


Figure 3.—Congenital dislocation of the left hip diagnosed at birth. A, Initial treatment with triple diapers failed to achieve relocation. B, Application of Pavlik harness at age two months. C, After one month of treatment, relocation is obtained. D, Result at two years of age is satisfactory.

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epiphysis appeared following treatment with a Barlow splint for a unilateral dislocatable hip.

Pavlik Harness

Primary treatment. A total of 15 hips in 13 patients were treated initially with a Pavlik harness (Table 4). Reduction was accomplished in all 15 and the mean duration of follow-up was 11½ months. However, acetabular dysplasia developed in two of these. One was in a child whose treatment commenced at one year of age, and the

other was diagnosed at the age of five months following which the harness was then used for four months. **Secondary treatment.** Fourteen hips in 11 patients were treated with a Pavlik harness after other treatments had failed (Figure 3, Table 4). In two of these, aseptic necrosis of the femoral capital epiphysis developed; however, in these two the initial treatment had been closed reduction. In one case with dislocation of both hips, aseptic necrosis occurred only in the left. In three of the 14 hips, relocation did not occur, and of these two had been treated previously with closed reduction and one had been treated with a Frejka pillow. In two cases with dislocation of both hips, initial treatment resulted in relocation of the right hip but not the left. In one case there was persistent acetabular dysplasia following initial treatment with closed reduction and plaster immobil-

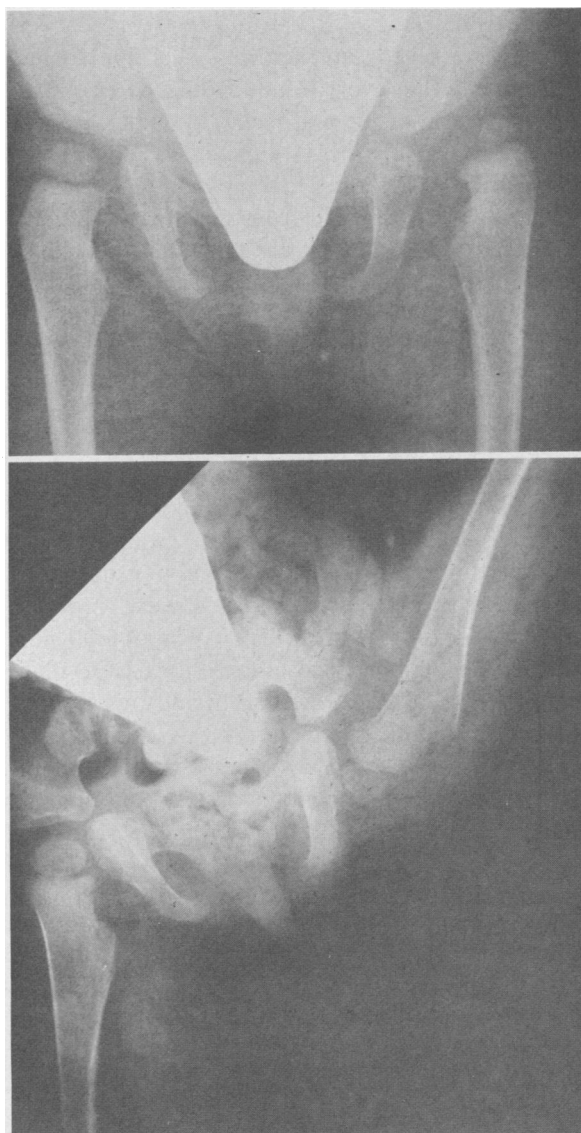


Figure 4.—Diagnosis of congenital dislocation of the left hip delayed to age 17 months. **A**, Roentgenogram at beginning of treatment. Relocation was obtained after ten days of traction. Containment was subsequently attempted with frog-leg spica cast. **B**, Roentgenogram at end of treatment shows that the frog-leg position resulted in inferior and anterior dislocation.

TABLE 5.—31 Hips Treated With Closed Reduction, 22 as a Primary Treatment

	Success	Dysplasia	Redislocation	Aseptic Necrosis
Primary treatment				
Within the first 48 hours	1	1	1	..
Third day to fourth month	1	..	..	2
After the fourth month	1	6	7	2
Secondary treatment . .	1	3	5	..



Figure 5.—Diagnosis of congenital dislocation of the hip delayed to age 4 months. Initial treatment with abduction splint, followed by spica cast after manipulation. Late roentgenogram shows acetabular dysplasia and sequelae of aseptic necrosis.

ization for six weeks; after this, a Pavlik harness was applied for an unknown duration. This patient was seen by us five years after initial treatment when persistent subluxation of the right hip was present.

Closed Reduction

Of 22 hips in 17 patients treated initially with closed reduction, there was redislocation in eight (Figure 4, Table 5). In one bilateral case, treatment of both hips failed. In seven hips acetabular dysplasia developed and in four, aseptic necrosis of the femoral capital epiphysis occurred. (Figure 5). Of the nine cases given secondary treatment with closed reduction, there were no further sequelae in one hip, redislocation occurred in five and acetabular dysplasia eventually developed in three.

Ultimately in the entire group of 78 dislocations of the hip, open reduction was required in 28 hips, either initially or after failure of one or more previous attempts at relocation by other methods.

Discussion

Is progress being made in preventing persistent dislocation of the hip by early diagnosis in newborn infants? Of the 62 patients referred to us with a diagnosis of CDH, the condition was diagnosed in only 25 percent within the first 48 hours after birth, and in almost 20 percent after 12 months. These data must be compared to such studies as those done in Malmö¹ and Edinburgh⁵ in which diagnosis was delayed beyond the first two days after birth in only 0.007 and 0.0125 percent of the cases, respectively. In contrast, in the study by Jones and co-workers⁴ 50 percent of the cases of dislocatable hips were missed by hospital physicians and 72 percent were missed by family physicians. Furthermore, in a survey done at the Tel Aviv University Medical School,⁷ treatment of CDH was begun during the first six months after birth in only 71 percent of the cases.

An explanation for the late diagnosis of CDH in some areas of the country probably rests in part with the relative rarity of the problem coupled with low birth rates. Consequently, physicians have difficulty recognizing a disease with subtle clinical findings unless they have had previous experience with it. However, all patients in our study were born in metropolitan hospitals with high standards of practice and most were examined by pediatricians shortly after birth.

Therefore, we still do not know whether there is a type of CDH that is clinically silent at birth and presents later with subluxation and acetabular dysplasia.¹⁴⁻¹⁶ There is at least one case in our group that was probably in this category: a patient was examined by many pediatricians after being admitted to hospital for other neonatal problems, and it was felt that there were no clinical signs of dislocation of the hip. The first *scatto* or *ressaut* sign in which the femoral head glided over the acetabular ridge with a jolt was not found until the patient was five months old.

While the issue of early diagnosis of CDH has not been resolved satisfactorily, it is nonetheless indisputable that every infant should be examined for dislocation of the hip during the first 48 hours after birth by using the testing methods of Ortolani and Barlow. Clicks in the hips do not confirm diagnosis. A definite jolt from the exit and reentry of the femoral head into the acetabular cup, once found by an examining physician, is unforgettable and confirms the diagnosis. Examination of the hip in an infant during each visit to a physician during the first year of life continues to be as important as the first neonatal examination for the most satisfactory outcome.^{4,17}

A second major consideration is the effectiveness of treatment once the diagnosis has been made, especially in the newborn group. In this study, all of the dislocations of the hip diagnosed early and treated with triple diapers required secondary forms of treatment. In about 50 percent of the patients whose conditions were diagnosed within 48 hours after birth and treated with abduction splints, secondary forms of treatment were necessary as well. It is not possible to compare results of treatment of cases referred after failure of treatment and those sent before treatment. However, if we look at 12 dislocations of the hip treated by us initially with the Pavlik harness, good results with this device seem obvious even in cases referred after the fourth month (Table 6).

Closed reduction was used only in cases in which diagnosis and treatment had been delayed. In cases treated with closed reduction there were major complications including redislocation, acetabular dysplasia and aseptic necrosis of the femoral head.

It must be recalled that the cases reported here represent a skewed group because almost all of the patients were referred only after there had been uncertainty of the management of the con-

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dition. The data suggest that even if CDH is diagnosed early and therapy is begun, there still may be complicated courses.

It is thought that in about 80 percent of dislocations of the hip in infants, reduction occurs spontaneously,³ in which case a patient may fare well regardless of treatment methods. However, it is impossible to predict the group to which a case belongs. The unsatisfactory outcome in nine cases treated with triple diapers and subsequently referred to us points to this inability.

TABLE 6.—Results of Primary Treatment of 14 Hips at Children's Hospital at Stanford (open reduction in one hip is not reported)

	Success		Failure	
	Pavlik Harness	Closed Reduction	Pavlik Harness	Closed Reduction
Within the first 48 hours	3	..	..	..
Third day to fourth month	6	..	..	..
After the fourth month	2	..	1	2

TABLE 7.—The 33 (32) Failures Related to Primary Treatment; in 15 Cases Open Reduction Was Done as Secondary Treatment

	Within the First 48 Hours	Third Day to Fourth Month	After the Fourth Month
Dysplasia (12)			
Abduction devices . (1?)	..	..	3
Pavlik harness ... ..	..	..	2
Closed reduction . 1	..	..	6
TOTAL	1	..	11
Redislocation (15)			
Abduction devices . 3	3	3	1
Pavlik harness ... ..	..	..	..
Closed reduction . 1	..	..	7
TOTAL	4	3	8
Aseptic necrosis (6)			
Abduction devices . 2	..	..	..
Pavlik harness ... ..	..	..	..
Closed reduction . ..	..	2	2
TOTAL	2	2	2

Table 7 shows that the most failures in treatment occurred when diagnosis was made late. Of 32 instances in which initial treatment failed (with 33 complications), diagnosis had been made after the fourth month in 21.

We have concluded that the standards of early diagnosis established by such studies as those in Malmö, have not been realized in our area. While CDH might be diagnosed within the 48 hours after birth, this study of referred cases does not prove that early diagnosis necessarily yields the best results. We can conclude from our experience that the Pavlik harness is both an effective and predictable form of treatment when it is accurately fitted and there is careful follow-up.¹³

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